

Storm warnings were displayed on parts of the Texas coast and small-craft warnings for the other portions on the 1st, 8th, 11th, and 19th, and small-craft warnings on the 4th, 7th, 10th, 25th, and 31st. Winds occurred which justified the warnings. No general storm occurred without warnings.

"Norther" warnings were issued for United States shipping interests at Tampico, Mexico, on the 1st and 21st.—*I. M. Cline.*

#### DENVER FORECAST DISTRICT

Viewing the month as a whole, there were marked contrasts in weather conditions over the district. In Montana and northern Wyoming very mild and dry weather prevailed, with mean temperatures from 3° to 8° above normal; in Utah and Colorado, on the other hand, cold and stormy weather predominated, especially in northeastern Colorado, where it was the coldest March since 1909, and where more than double the normal amount of precipitation occurred. In New Mexico and Arizona more settled conditions prevailed, with temperature and precipitation both somewhat below normal. Many lows passed eastward along the Canadian border and a number of active disturbances crossed the central portion of the district. On the evening of the 18th, a low in the southwest and a high on the northeastern Rocky Mountain slope both having increased in intensity, with a sharp fall in temperature over Wyoming and northern Colorado, warning of a moderate cold wave was issued for southern Colorado and repeated for southwestern Colorado on the morning of the 19th. These warnings were fully verified over the regions specified, and the cold wave extended southward over New Mexico. On the evening of the 31st, with a low moving rapidly eastward over Kansas, followed by a sharp temperature fall in southeastern Wyoming and with mild temperature in eastern Colorado, a moderate cold-wave warning was issued for eastern Colorado. This warning was verified in the extreme eastern part of the State. Warnings to the air-mail service of fresh to strong westerly winds were issued for Wyoming on the evening of the 6th, and for Wyoming and northeastern Colorado the evening of the 14th. Frost warnings were issued for southern New Mexico on the 29th and 31st; temperatures low enough for the formation of frost occurred in the latter instance.—*E. B. Gittings.*

#### SAN FRANCISCO FORECAST DISTRICT

Unlike February, when the area of high barometer normally found central off the California coast was feeble or wholly absent and cyclones moved onto the coast in low latitudes, the month of March passed with this area of high barometric pressure fully organized and persistent, and consequently the types of cyclones and anticyclones experienced over the far Western States were radically different from those of the preceding month. As is usual when the anticyclone off the California coast is fully organized, the rainfall over California is deficient, and March proved no exception to this rule. Another striking feature of the pressure distribution over the western North American Continent and the northeast Pacific Ocean was the persistent high barometric pressure with cold weather, the coldest of the winter, over the Bering Sea and the equal persistence of low barometric pressure over the Gulf of Alaska, whence cyclones on many days passed eastward or southeastward onto the continent, and thus frequently caused the formation of

secondary cyclones over the intermountain region. As a result of the influences of these more or less persistent types of pressure distribution, the month passed without excessive rains in any part of the district, but with frequent occasions demanding the issue of warnings of frosts and freezing temperatures, except on the immediate coast. Storm warnings were rarely required and then only for the Washington and Oregon coasts and the inland waters of Washington.

After the 27th, the area of high barometric pressure off the California coast disappeared, and this disappearance was followed by general rains over California during the closing days of the month.

In addition to the general forecasts and warnings and the special forecasts for orchard heating, the district center issued regularly during the month flying-weather forecasts for the commercial airways of the district.—*E. H. Bowie.*

#### RIVERS AND FLOODS

By H. C. FRANKENFIELD

As the great flood in the Mississippi River and many of its tributaries continued at the end of the month, report thereon will be postponed until the end of the flood in the extreme lower river, which will probably be about the end of May.

*Atlantic drainage.*—Melting snows from high temperatures accompanied by moderate rains resulted in ordinary flood stages in the Connecticut River and in the Susquehanna River and tributaries in the State of New York about the middle of the month. The usual warnings were issued and the damages were small, virtually none in New England and about \$5,000 in New York. Savings in New York through the warnings were about \$10,000. There were also moderate floods in the rivers of the Carolinas between March 8 and 15 for which the usual warnings were issued. The damage was nominal.

*East Gulf drainage.*—There was a flood of substantial proportions in the Tombigbee River of Alabama and Mississippi, and in the Black Warrior River of Alabama, following the heavy rains of March 7, 8, and 13. Warnings were issued on March 9 and supplemented on March 13 and 14. At Demopolis, Ala., the crest in the Tombigbee River was 51.8 feet, 12.8 feet above the flood stage, on March 20, and the river was above the flood stage from March 10 to 29, inclusive. As movable property had been taken away preceding the high floods of January and February, the losses were very small, only about \$4,900, while the reported value of property saved through the warnings was \$24,925.

The rivers of the Pascagoula system were also in moderate flood about the middle of March. Warnings were issued and there was no damage of consequence. Pearl River, of Mississippi and Louisiana, was also in flood much of the month, especially at Jackson, Miss., but again there was no loss except as occasioned by suspension of business.

*Great Lakes drainage.*—Rains from March 18 to 21 caused moderate floods in the rivers of the Lake Erie drainage, but there was only some slight damage from overflow and seepage. Warnings were issued at the proper time.

*Mississippi drainage—Ohio Basin.*—The quite heavy rains during the third week of March resulted in floods throughout the Ohio River below Louisville, Ky., and in all its tributaries. They were not severe except in the Wabash system, in the Green River of Kentucky, and

in the Ohio below the mouth of the Tennessee River. At Evansville, Ind., there was a crest of 39.9 feet on March 25, and one of 52.8 feet at Cairo, Ill., on the same date. There was also a very moderate local flood in the Parkersburg, W. Va., district on March 23, but without damage. The lower river was still in flood at the close of the month, and further report thereon will be incorporated in the report to be made of the Mississippi flood.

The tributary floods in Pennsylvania and Ohio were not very alarming, although there was considerable flooding of lowlands in Ohio, and some low-lying streets in the city of Sidney, on the Miami River, were under water. The aggregate damage was not large. Over the Wabash system of Indiana the floods were more pronounced, and the lower Wabash and the extreme lower White River were still in flood at the close of the month. Losses aggregated \$128,150, while the reported value of property saved by the warnings was \$53,000.

The flood in the Cumberland River did not extend above Nashville, Tenn. It was well forecast, and the losses amounted to \$218,000, of which \$215,000 occurred at Eddyville, Ky. Money value of property saved by the warnings was \$25,000.

The flood in the Tennessee River was quite marked from Florence, Ala., to the mouth of the river, mainly on account of a very heavy one-day rainfall of 3.25 to 4.15 inches on March 12-13. Warnings were issued promptly, and while more than 23,000 acres of land were overflowed, the reported losses were only \$46,000. There was little remaining to lose after the flood of December-January. Savings by the warnings were given as \$12,850.

*Mississippi drainage except the Ohio.*—The Mississippi above Cairo, Ill., except at St. Louis, Mo., was in moderate flood between March 22 and 26, and at the end of the month the advance of another rise had reached Hannibal, Mo. The Illinois River, except the extreme upper portion, continued generally in flood during the month, and there were also moderate floods in the Meramec and Osage Rivers of Missouri beginning on March 22 and continuing for a few days.

The moderate floods in the White and Black Rivers of Arkansas between March 18 and 30 were without special incident, as previous floods had caused all damage that could be done except at very high stages.

The Yazoo River of Mississippi remained in flood throughout the month.

The floods in the Ouachita and Atchafalaya Rivers will be taken up later in connection with the Mississippi flood.

There were floods of fair proportions during the early days of the month in the Sulphur River of Texas, and about the middle of the month in the Cypress River, also of Texas. Warnings were prompt and property valued at \$7,500 was reported as saved thereby. Loss and damage amounted to \$5,300.

*West Gulf drainage.*—The Sabine River of Louisiana and Texas was in moderate flood from March 14 to 17 and 24 to 30, from heavy rains on March 7, 8, 11, 20, and 21. Warnings were prompt and there were no losses of consequence.

A flood in the Trinity River of Texas, while more marked than the Sabine flood, was also unattended by material damage, and property valued at \$8,000 was saved by the warnings.

**NOTE.**—The ice in the Wisconsin River at Wausau, Wis., went out on March 15, marking the earliest break-up since that of March 10, 1857.—*Press dispatch.*

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Connecticut:	<i>Feet</i>			<i>Feet</i>	
White River Junction, Vt.....	15	19	20	15.0	Mar. 19-20
Hartford, Conn.....	16	17	24	19.0	20
Susquehanna:					
Oneonta, N. Y.....	12			14.9	15
Bainbridge, N. Y.....	11	14	16	15.0	15
Binghamton, N. Y.....	14	14	15	15.4	15
Unadilla; New Berlin, N. Y.....	8	13	16	12.4	14
Chenango; Sherburne, N. Y.....	8	13	16	9.1	14
		21	21	8.1	21
Tar; Greenville, N. C.....	14	12	13	14.0	12-13
Neuse; Smithfield, N. C.....	14	7	11	15.9	9-10
Cape Fear; Elizabethtown, N. C.....	22	8	13	27.4	11
Peedee:					
Cheraw, S. C.....	27	11	11	27.2	11
Mars Bluff, S. C.....	17	(1)	2	17.5	{Feb. 28 Mar. 1
		9	17	19.6	Mar. 14
Santee:					
Rimini, S. C.....	12	(1)	19	13.9	Mar. 1
Ferguson, S. C.....	12	(1)	21	13.3	2
Broad; Blairs, S. C.....	15	10	10	15.2	10
EAST GULF DRAINAGE					
Tombigbee:					
Aberdeen, Miss.....	33	14	17	37.0	15
Lock No. 4, Demopolis, Ala.....	39	(1)	1	52.5	Feb. 22-23
		11	29	51.8	Mar. 20
Chickasawhay; Enterprise, Miss.....	21	15	15	21.0	15
Pearl:					
Edinburg, Miss.....	21	14	18	23.2	15
Jackson, Miss.....	20	(1)	5	30.0	Feb. 23-24
		13	28	29.8	Mar. 21
Columbia, Miss.....	18	(1)	6	21.2	Feb. 16
		23	27	18.3	Mar. 24-25
West Pearl; Pearl River, La.....	13	(1)	(1)	16.4	Feb. 18
GREAT LAKES DRAINAGE					
Maumee:					
Fort Wayne, Ind.....	15	21	25	17.6	Mar. 23
Napoleon, Ohio.....	10	22	23	11.6	23
Auglaize; Defiance, Ohio.....	10	21	23	11.6	22-23
Sandusky:					
Upper Sandusky, Ohio.....	13	20	22	15.0	21
Tiffin, Ohio.....	7	21	23	8.6	22
Fremont, Ohio.....	11	22	23	12.0	22
MISSISSIPPI DRAINAGE					
Ohio:					
Marietta, Ohio.....	33	23	24	34.3	23
Cloverport, Ky.....	40	23	25	40.5	24
Evansville, Ind.....	35	(1)	6	37.3	2
		20	(1)	39.9	25
Dam No. 48, Cypress, Ind.....	35	1	5	35.9	3
Mount Vernon, Ind.....	35	21	(1)	39.1	26-29
		1	5	36.0	3
Shawneetown, Ill.....	35	21	(1)	35.7	4
		19	(1)		
Paducah, Ky.....	43	20	27	44.6	24
Cairo, Ill.....	45	17	(1)	52.8	25
Beaver; Beaver Falls, Pa.....	11	21	21	11.2	21
Shenango; Sharon, Pa.....	9	21	23	10.2	22
Muskingum:					
Zanesville, Ohio.....	25	22	24	26.7	22
McConnelsville, Ohio.....	22	21	25	25.8	23
Beverly, Ohio.....	25	23	23	25.2	23
Tuscarawas:					
Gnadenhutten, Ohio.....	9	20	25	15.2	22
Coshocton, Ohio.....	8	20	25	17.1	22
Walhonding; Walhonding, Ohio.....	8	20	23	14.2	21
Scioto:					
Larue, Ohio.....	11	20	22	15.0	21
Prospect, Ohio.....	10	20	24	15.0	22
Bellpoint, Ohio.....	9	20	23	11.5	21
Dublin, Ohio.....	8	21	21	8.5	21
Circleville, Ohio.....	10	20	24	16.2	22
Chillicothe, Ohio.....	16	21	24	22.1	23
Olentangy; Delaware, Ohio.....	9	20	22	14.9	21
Miami:					
Sidney, Ohio.....	12	20	22	14.2	21
Middletown, Ohio.....	15	22	22	15.1	22
Stillwater; Pleasant Hill, Ohio.....	13	20	21	15.0	20
Green:					
Lock No. 4, Woodbury, Ky.....	33	14	15	33.5	15
		21	25	39.4	23
Lock No. 2, Rumsey, Ky.....	34	13	(1)	40.6	27
Barren; Bowling Green, Ky.....	20	21	23	22.4	22
Wabash:					
Bluffton, Ind.....	11	20	24	14.0	22
Logansport, Ind.....	15	22	22	15.0	22
Lafayette, Ind.....	11	20	26	21.1	23
Covington, Ind.....	16	20	27	24.6	24
Terre Haute, Ind.....	16	21	29	20.7	25
Vincennes, Ind.....	14	21	(1)	19.5	28
Mount Carmel, Ill.....	16	19	(1)	24.3	28
Tippecanoe; Norway, Ind.....	6	7	8	6.2	8
		14	15	6.2	14-15
		20	28	6.5	26

1 Continued from last month.

2 Continued at end of month.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
	Feet			Feet	
White: Decker, Ind.	18	21	(?)	25.8	Mar. 27
White, East Fork:					
Seymour, Ind.	10	21	24	13.8	22
Williams, Ind.	10	23	27	15.8	25
Shoals, Ind.	20	23	28	26.6	26
White, West Fork:					
Anderson, Ind.	12	20	22	17.5	21
Noblesville, Ind.	14	20	22	18.1	21
Indianapolis, Ind.	18	21	22	19.2	21
Elliston, Ind.	19	19	27	28.1	23
Edwardsport, Ind.	15	20	29	20.0	24
Cumberland:					
Nashville, Tenn.	40	14	14	40.0	14
Clarksville, Tenn.	46	13	17	51.1	15
Lock F, Eddyville, Ky.	57	16	23	58.8	18
Tennessee:					
Widows Bar Dam, Ala.	26	(1)	(3)	20.7	Feb. 27
		10	13	29.0	Mar. 12
Florence, Ala.	18	12	15	23.9	13
Riverton, Ala.	33	1	3	33.7	2
		11	19	44.3	14
Savannah, Tenn.	40	14	18	43.0	15
Johnsonville, Tenn.	31	14	22	36.3	16
Elk: Fayetteville, Tenn.	14	9	9	15.4	9
Mississippi:					
Hannibal, Mo.	13	31	(?)		
Louisiana, Mo.	12	21	23	12.9	22
Grafton, Ill.	18	21	25	19.7	22
Alton, Ill.	21	21	25	22.9	22
Cape Girardeau, Mo.	30	21	28	33.3	24
New Madrid, Mo.	34	17	(?)	40.4	25-26
Cottonwood Point, Mo.	34	20	(?)	37.6	27
Memphis, Tenn.	35	18	(?)	41.4	30
Helena, Ark.	44	20	(?)		
Arkansas City, Ark.	48	(1)	1	51.8	Feb. 17-19
		21	(?)		
Greenville, Miss.	42	24	(?)		
Vicksburg, Miss.	45	(1)	(?)		
Natchez, Miss.	46	(1)	(?)		
Angola, La.	45	(1)	(?)		
Baton Rouge, La.	35	(1)	(?)		
Donaldsonville, La.	28	(1)	(?)		
New Orleans, La.	17	(1)	(?)		
Spirit: Tomahawk, Wis.	14	18	18	14.7	Mar. 18
Illinois:					
Morris, Ill.	13	22	25	13.8	23-24
Peru, Ill.	14	(1)	(?)	18.3	26
Henry, Ill.	10	(1)	5	16.1	Feb. 9
		13	(?)	13.0	Mar. 26-27
Peoria, Ill.	18	19	(?)	19.8	27
Havana, Ill.	14	(1)	(?)	18.0	28-30
Beardstown, Ill.	14	(1)	(?)	20.5	28-29
Pearl, Ill.	12	(1)	(?)	18.0	22
Meramec:					
Pacific, Mo.	11	20	23	15.8	22
Valley Park, Mo.	14	20	23	17.0	23
Bourbeuse: Union, Mo.	12	21	22	13.7	22
Missouri: St. Charles, Mo.	25	21	21	25.3	21
Osage:					
Osceola, Mo.	20	21	23	21.4	22
Warsaw, Mo.	22	20	25	25.6	22
Tusculum, Mo.	25	19	27	32.4	23
Arkansas: Yancopin, Ark.	29	(1)	(?)		
Neosho: Oswego, Kans.	17	20	22	20.1	21
Petit Jean: Danville, Ark.	20	19	23	24.1	20
White:					
Batesville, Ark.	23	18	18	23.8	18
Georgetown, Ark.	22	22	31	22.9	26-27
Black:					
Poplar Bluff, Mo.	14	19	22	14.8	19
Corning, Ark.	11	14	(?)	13.6	23
Black Rock, Ark.	14	18	(?)	19.9	21-22
Cache: Patterson, Ark.	9	21	(?)	10.5	27
Yazoo: Yazoo City, Miss.	25	(1)	(?)		
Tallahatchie: Swan Lake, Miss.	25	(1)	7	31.1	Jan. 7-9
		10	(?)	31.8	Mar. 22
Sulphur:					
Ringo Crossing, Tex.	20	1	5	26.3	2
		8	13	23.9	9
Finley, Tex.	24	4	18	27.4	11
Cypress: Jefferson, Tex.	18	14	16	19.2	15
Ouachita:					
Arkadelphia, Ark.	18	8	8	18.6	8
Camden, Ark.	30	10	17	35.0	12
Monroe, La.	40	20	(?)		
Atchafalaya: Melville, La.	37	(1)	(?)		
WEST GULF DRAINAGE					
Sabine: Logansport, La.	25	14	18	25.8	16
		24	30	26.9	26
Trinity:					
Dallas, Tex.	25	2	5	30.5	3
		7	11	31.6	9
Trinidad, Tex.	28	5	18	37.0	13
Long Lake, Tex.	40	17	19	40.4	18
Liberty, Tex.	25	12	18	26.0	13-15
		22	30	26.8	27-28
Trinity, Elm Fork: Carrollton, Tex.	7	2	2	7.8	2

<sup>1</sup> Continued from last month.

<sup>2</sup> Continued at end of month.

<sup>3</sup> Below flood stage at 8 a. m., Mar. 1.

## MEAN LAKE LEVELS DURING MARCH, 1927

By UNITED STATES LAKE SURVEY

[Detroit, Mich., April 4, 1927]

The following data are reported in the Notice to Mariners of the above date:

Data	Lakes <sup>1</sup>			
	Superior	Michigan and Huron	Erie	Ontario
Mean level during March, 1927:				
Above mean sea level at New York	Feet 601.31	Feet 578.48	Feet 571.10	Feet 245.71
Above or below—				
Mean stage of February, 1927	-0.01	+0.23	+0.13	+0.40
Mean stage of March, 1926	+1.12	+0.94	+1.08	+1.87
Average stage for March, last 10 years	-0.07	-1.04	-0.28	+0.44
Highest recorded March stage	-1.01	-4.47	-2.75	-2.10
Lowest recorded March stage	+1.12	+0.94	+1.08	+1.87
Average departure (since 1860) of the March level from the February level	-0.10	+0.15	+0.18	+0.26

<sup>1</sup> Lake St. Clair's level: In March, 1927, 573.17 feet.

## EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS, MARCH, 1927

By J. B. KINCER

*General summary.*—Precipitation was rather frequent during the first decade over the East and Southeast, attending the passage of several storm areas, but following these much colder weather overspread these sections, with freezing temperatures extending to the east Gulf coast. Temperature changes were not marked in the western part and precipitation was largely of a local character. Widespread rain or snow occurred in the Southwest during the second decade, with general rains throughout the interior. It was rather warm for the season in the East about the 18th, with widely scattered stations reporting the highest temperatures of record for so early in the spring. At the same time it was considerably cooler over western districts, with a marked fall in temperature over the Southwest on the 20th. A reaction to cooler set in over eastern sections during the last week, and in western States the tendency was still to rather low readings, although conditions were more seasonable. Precipitation was rather frequent during the latter part of the month over the central valleys and the lake region, and during the last week general rain or snow occurred over northern areas east of the upper Mississippi Valley.

The frost and freezing temperatures that overspread the Southeastern States early in the month, while not unusual for the season, caused considerable damage to early fruit bloom, and some harm resulted to tender vegetation. The frequent rainfall and cold weather made conditions rather unfavorable for field work in much of the South, and plowing and planting were not very active. Some cotton was planted in the southwestern part of the belt and a little corn was put in as far north as southeastern Oklahoma, but in much of the interior valleys the soil continued mostly too wet for field operations. Fruits continued their unseasonable advance, with the earlier varieties blooming as far north as southern Missouri and the lower Ohio Valley.

Much interruption to field work was reported during the second decade, although conditions became more favorable toward the close, with preparations for planting in the Cotton Belt advancing fairly well, but in portions of the Northwest it remained too wet. Except